

An Alternate to the UNH-G Family of Distributions with Illustration

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Abstract

In this short communication we propose an alternate to the UNH-G family of distributions appearing. Further we show a sub-model of the new family is good in fitting real life data. Readers are asked to investigate further properties and applications of the new class of statistical distributions.

Keywords: UNH-G; Weibull; Exponential; Modified; Guinea pigs data

AMS Subject Classifications: 62exx

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Introduction to the New Family

The new family can be seen as a certain modification of the Weibull or Exponential distributions, to introduce the following as its CDF

$$F(x; a, b, c, \xi) = \frac{1 - e^{-b((G(x;\xi)+1)^a - 1)^c}}{1 - e^{b(-(2^a - 1)^c)}}$$

Where G is some baseline distribution with parameter vector ξ , and $a, b, c > 0$. Obviously, the PDF can be obtained by differentiating the CDF. The new distribution is a good fit to real life data as shown in the next section [1,2].

Practical Illustration

We assume $a = b = c = 1$, and the baseline distribution is Dagum with the following CDF

$$G(x; \xi) = \left(\left(\frac{x}{h} \right)^{-g} + 1 \right)^{-f}$$

Where $x, f, g, h > 0$. Thus the CDF of the new distribution (Modified Weibull-Dagum) is given by

$$F(x; f, g, h) = \frac{1 - e^{-\left(\left(\frac{x}{h} \right)^{-g} + 1 \right)^{-f}}}{1 - \frac{1}{e}}$$

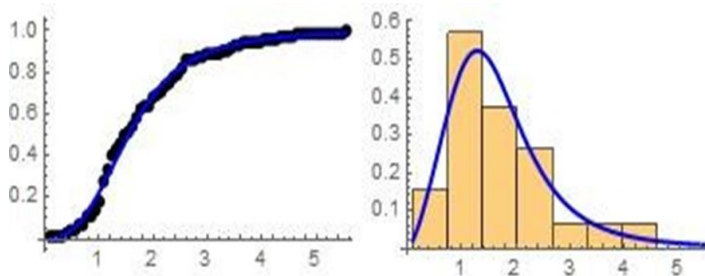


Figure 1: The CDF and PDF of $MWD(0.70896, 3.48504, 2.10098)$ fitted to the empirical distribution and histogram of the survival times of guinea pigs data.

Notation: We write $J \sim MWD(f, g, h)$ if J is a modified Weibull Dagum random variable



Open Problem

It is an open problem to obtain properties and applications of this new class of statistical distributions. The author invites readers to tackle this open problem.

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